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Conference Chairs Harvey A. Wigdor, John D. B. Featherstone, and Peter Rechmann

ABSTRACT TITLE:
Optical Coherence Tomography for Diagnosing Periodontal Disease

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PRESENTATION:
Oral Presentation preferred

ABSTRACT TEXT:
Optical techniques can be used to develop a noninvasive system for evaluating the progress of periodontal disease in gum tissue. Periodontal disease is a major cause of tooth loss, associated with plaque-induced inflammatory disorders that result in the loss of connective tissue attachment and alveolar bone. Current probes use mechanical or pressure-sensitive mechanisms to detect the loss of connective tissue attachment and alveolar bone by measuring detachment from the cemento-enamel junction. Several types of error in these probes, including examiner variation and anatomical differences in tooth contour between patients, limit resolution to +/- 1 mm. Since even the most severe cases of periodontal disease result in less than 12 mm detachment of gingival tissue from tooth, these resolutions are inadequate for accurate monitoring of disease progression. Optical coherence tomography has been used to produce a visual recording of the surface topography within the periodontal pocket of in vitro specimens, pinpointing potential sites of disease progression with <0.05 mm resolution. These inteferometric maps depict soft and hard tissue boundaries, precisely locating the cemento-enamel junction and the connective tissue attachment. Changes in the optical properties of directionally oriented tissues, such as the gingival fiber groups, can be used to distinguish tissue structure and composition.

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KEYWORD:
OCT, optical, noninvasive, coherent, periodontal

BRIEF BIOGRAPHY:
Bill Colston is currently completing his postdoctoral degree in Biomedical Engineering at University of California at Davis. He has performed research at Lawrence Livermore National Laboratory for the past seven years in various areas of optical engineering, with applications ranging from environmental monitoring using fiber optic sensors to nonivasive medical imaging.